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A SIMPLE STEAM STERILIZER FOR FARM DAIRY UTENSILS



STERILIZATION of dairy utensils is necessary for the production of dairy products of high quality, particularly milk and cream, because the washing of dairy utensils, at least by the process ordinarily used, is not sufficient to insure freedom from infection and contamination.

Dairy utensils on small farms are not often sterilized efficiently, because steam is not available. Most sterilizers now in use require small boilers, and the whole sterilizing outfit often is regarded as too expensive to use, especially on farms where only a few cows are milked.

This bulletin describes a simple and inexpensive, yet efficient, steam sterilizer which can be provided at a cost of from \$10. to \$15, complete with kerosene stove. This is considered low enough to justify its use on any farm from which milk or cream is sold. The additional keeping quality which the sterilization of utensils will give milk and cream probably will pay for the cost of the sterilizer in one season.

Details of the construction of the sterilizer and how to use it are explained.

Contribution from the Bureau of Animal Industry

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A SIMPLE STEAM STERILIZER FOR FARM DAIRY UTENSILS.

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NECESSITY OF STERILIZING DAIRY UTENSILS.

DIRTY dairy utensils, and even those which apparently are clean but which have not been sterilized, contain vast numbers of bacteria which are added to milk or cream when it comes into contact with them. These bacteria when introduced into milk begin to grow and produce changes which spoil the product. When dairy utensils are sterilized by steam, all bacteria and disease germs which may be upon them are destroyed, and therefore milk and cream when placed in these utensils will keep sweet much longer. It is true that even when milk is produced under clean conditions it will contain a few bacteria, but when such milk is placed in unsterilized utensils or is run through an unsterilized strainer cloth or separator, large numbers of bacteria are added, which are liable to spoil the product quickly.

CONSTRUCTION OF THE STERILIZER.

The sterilizer described in this bulletin is designed to be of greatest use to farmers who have one, two, or three 10-gallon or smaller cans with a similar number of pails, strainer cloths, and a separator. It can be used, however, with a larger number of cans.

The sterilizer consists of the parts shown in figure 1. First is a roasting pan (A) of standard size, 20 inches long, 14 inches wide (top measurement), and 3 inches deep. The upper part consists of a close-fitting insulated cover (B), upon which is placed the box (C), with its removable top (D).

The cover is made as follows: Take a sheet of heavy galvanized iron and cut it large enough to allow it to project three-quarters of an inch over the edge of the pan. Bend the edges of the sheet so as to form a shallow box with sides three-eighths of an inch high. Then

cut out a cover for the shallow box. Cut a hole $1\frac{1}{2}$ inches in diameter in the center, through the top and the bottom, of the shallow box. Iron braces should be placed crosswise of the box to strengthen it. Then fill the shallow box completely with paper or asbestos sheets, after which the top is carefully soldered on, care being taken to make the seams absolutely tight. Solder a round, galvanized-iron pipe $4\frac{1}{2}$ inches long and $1\frac{1}{2}$ inches in diameter in the hole in the center of the cover. Solder flanges beneath the cover so that they will meet the edge of the roasting pan, thus making a tight cover. On the top of the insulated cover solder strong, folded, galvanized-iron strips, three-eighths of an inch high, to form a square 15 inches by 15 inches, for holding the upper galvanized-iron box. On top of the cover solder also four strips of stiff, galvanized iron 8 inches long and

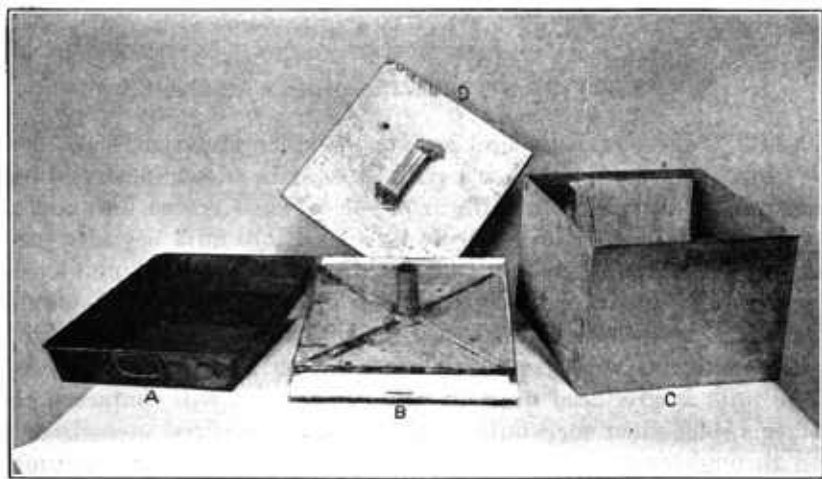


FIG. 1.—Parts of the steam sterilizer: A, Roasting pan; B, cover of pan; C, galvanized-iron box; D, removable top of box.

three-eighths of an inch wide. These strips should extend three-eighths of an inch above the cover and run from a distance of 1 inch from the corners to 1 inch from the steam outlet in the center.

The galvanized-iron box (C) with removable top (D), which has a handle, is shown in the figure. The box has no bottom but fits in the square formed by the four strips on the cover. The box is 11 inches high. Inside it, three-fourths of an inch from the top and one-half inch from one side, a stiff wire should be riveted and soldered, as shown in figure 1, where a strainer cloth may be seen hanging. It is sometimes desirable to reenforce the box (C) at each corner with angle iron 6 inches long and one-half inch wide, riveted halfway up the side. The top of the box (D) should be made large enough to extend over the sides and fit closely. Figure 2 shows a dimension drawing of the parts of the sterilizer.

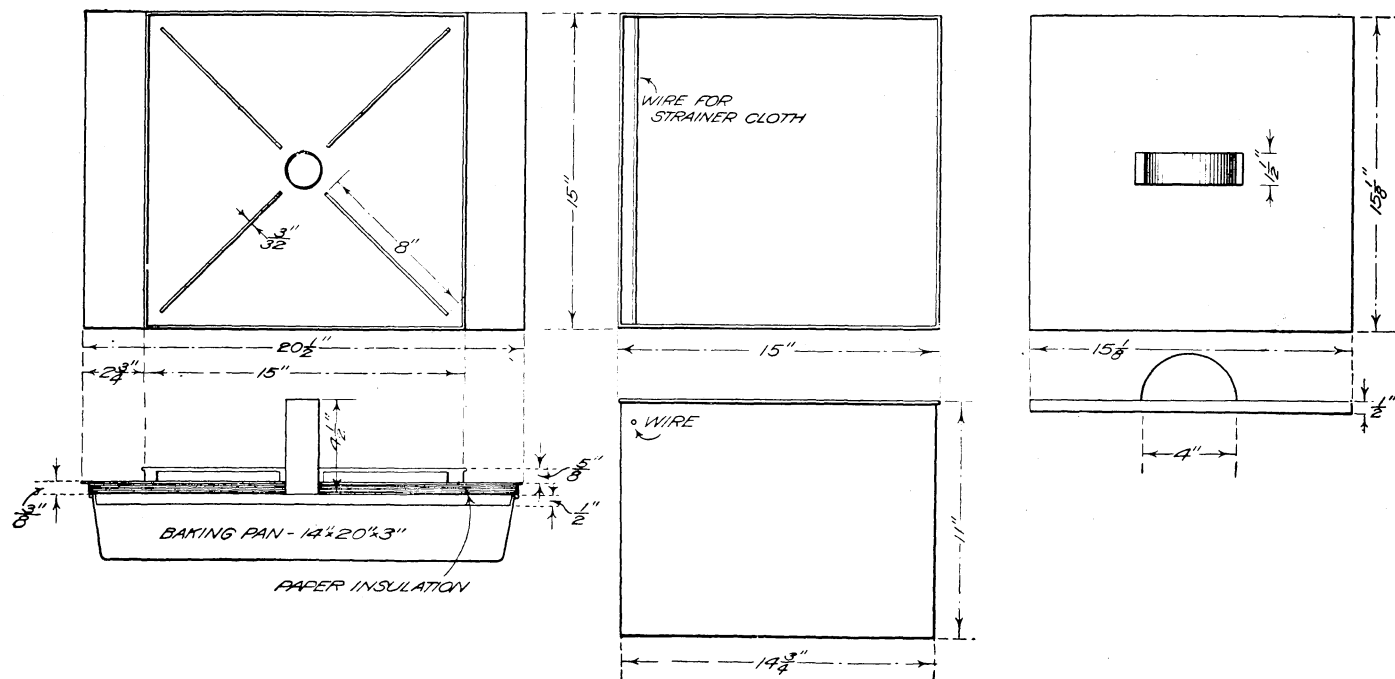


FIG. 2.—Dimension drawing of the parts of the sterilizer.

SOURCE OF HEAT.

In the department's tests of the outfit described a two-burner wickless kerosene stove was used with excellent results. The sterilizer, however, may be placed on the kitchen stove or over any other source of heat, such as a gas or gasoline stove or a laundry stove which burns either wood or coal. Good results are obtained at very little cost by building under the sterilizer a brick furnace 12 inches high. This furnace consists of a brick floor and walls of one width of brick, all tightly joined together with mortar. The ledge should be filled with mortar, and before it is set the roasting pan is placed in the mortar so that an impression is made. When the mortar is set, the pan will fit snugly. A small brick or stovepipe chimney should be constructed at the end of the furnace. It is necessary to have sufficient heat to furnish steam at the end of the outlet pipe at least 205° F., and 210° or 211° F. should be obtained if possible. The advantage of using a kerosene stove lies in the fact that a uniform supply of heat is provided. When the burners are working properly the temperature of the steam will be constant and no attention need be given after the temperature has reached 205° F. When other sources of heat are used, temperature readings must be taken at frequent intervals to see that the steam is 205° F. or above.

COST OF STERILIZER AND OPERATION.

The cost of the sterilizer itself should not be more than \$8. The roasting pan varies in price from 25 cents to \$1, depending on the grade of iron. The galvanized iron, with asbestos and construction work, should not cost more than \$7, and the work can be done by any tinner. A two-burner wickless kerosene stove costs from \$4 to \$5, but in many cases it will not be necessary to purchase a stove. Complete outfits are now made commercially in large numbers in different parts of the country at prices from \$10 up, complete with stove.

The cost of operation for the sterilization of two 10-gallon cans, with tops, two pails, and strainer cloth will be about one cent. When the sterilizer is used on the kitchen stove the cost, of course, would be very much less if the stove were already in use. It would take about 40 minutes to sterilize such an outfit.

RESULTS OBTAINED BY STERILIZATION.

When properly operated, this sterilizer destroys practically all the bacteria in the utensils, including all disease germs which may be present. It will accomplish the same results as any sterilizer in which steam not under pressure is used. Experiments with this sterilizer show that 5 minutes' steaming is, for practical purposes, as good as the 15 to 30 minute steaming usually recommended.

HOW TO OPERATE.

TOLD IN PICTURES.



Time can be saved by getting the sterilizer ready while preparations for washing are being made. There must be a hot fire. A clock and a Fahrenheit thermometer registering 212° are required. The sterilizer should be placed where there are no strong air currents. The roasting pan is first filled with about 1 inch of water.



When all the equipment is assembled, the next step is to put it together. The pan is placed on the heater and the insulated cover fitted snugly over it.



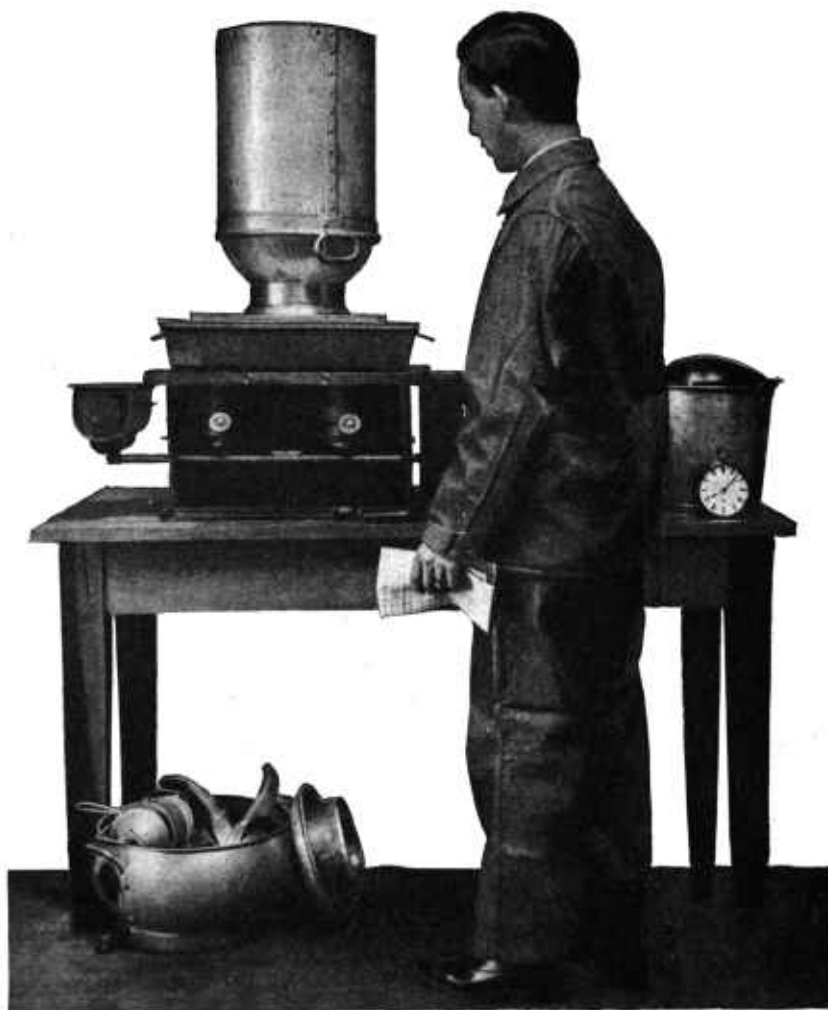
The thermometer should then be put into the top of the steam spout. Meanwhile preparations should have been made for washing the utensils, thorough cleansing being necessary just before sterilization. The dairyman should have a heater which will furnish quickly sufficient water at about 140° F. A washing tank large enough to hold a 10-gallon can should be provided, and, of course, a good, stiff brush and a supply of washing powder.

The utensils first should be rinsed out with warm water, then thoroughly scrubbed with a stiff brush, using hot water and washing powder. Utensils which feel oily or greasy after washing are not clean—more washing powder and harder scrubbing are required. After washing, the utensils should be well rinsed with clean, hot water. They are then ready to be sterilized.

By this time steam will be coming from the spout in the sterilizer. Steam begins issuing when the thermometer registers 150° F., but sterilization should not be attempted until the thermometer registers 205° F. The thermometer may then be removed and the sterilizer is ready for use.



Any piece of the equipment may be sterilized first. When the washed can is placed over the steam jet, the time should be noted. The operator can then proceed to wash other utensils.



The can should be left over the spout for 5 minutes, when it can be removed. It is, of course, too hot to be handled with bare hands. The operator should grasp it with a cloth or gloves. He should lift it off the steam spout, holding its mouth down, and allow it to drain for about 5 seconds.



The can is then set on the floor mouth up, thus permitting the steam to escape. Within two or three minutes the can will be perfectly dry, owing to the intense heat to which it has been subjected. The 5 minutes' steaming has not only rendered the can sterile, but has removed any foul odors that may have developed in it. The can should then be set aside until the cover is sterilized.



The pails and separator tank are then sterilized over the steam spout in the same manner as the milk cans. Each one should be sterilized for the full 5 minutes. The pails and separator tank should then be placed mouth down, in a clean, airy place, free from odors, dust, and flies, and should remain there until time for use again.



The can covers, straining cloths, and separator parts still remain to be sterilized. The galvanized-iron box is made to fit in place on the insulated cover with the steam spout in the center.



Smaller articles to be sterilized are placed in the box, the can covers being placed upright against the walls of the box with their sides facing inward, the straining cloths, which have been washed thoroughly, folded over the wire (see p. 4), and the other parts put in indiscriminately. The box cover is then put on and the contents steamed for 5 minutes. When the operations are finished, the sterilizer is taken apart and every part wiped dry to prevent rusting. This is easily done if the different parts are still warm. If the cans and covers have been sterilized properly, it is not necessary to touch them until milk is ready to be put into the cans. It is unnecessary to rinse out the cans before filling with milk,

POINTS TO REMEMBER.

1. Rinse utensils in warm water, then wash thoroughly with hot water and washing powder. Utensils must be washed clean before sterilization, but washing alone, however thorough, is not sufficient. Sterilization is not a substitute for washing.

2. One inch of water in the roasting pan will furnish steam at a temperature of 211° F. for about 50 minutes.

3. The temperature of the steam as it comes from the outlet pipe must be at least 205° F. and preferably 210° or 211° F. An accurate thermometer, with a scale reading to 212° F., is necessary to determine the temperature.

4. When the sterilizer is not used on a kerosene stove, temperature readings must be taken frequently, to see that the temperature of the steam is 205° F. or above.

5. Cans, pails, covers, and strainer cloths must be steamed for a full 5-minute period. Longer steaming will do no harm, but is not necessary.

6. Some form of insulation is recommended for use over utensils which are being sterilized in a cold room. A blanket can be provided easily for this purpose, and is desirable in order to keep the cans or pails hot long enough after sterilization to dry out quickly.

7. Cans should be dry in two or three minutes after removal when placed upright. If they do not dry within that time, they have not been heated sufficiently or were not washed clean.

8. The drying of dairy utensils after washing and sterilization is extremely important, for bacteria may develop in a moist can.

9. After the utensils are sterilized and dried they should be placed in a room free from dust and should not be touched until milk is placed in them. Pails after steaming and drying should be placed upright in a clean, dry, covered wooden or metal box, where they should remain until milking time.

10. When using a kerosene or gasoline stove the sterilizing should be done in a room where milk is not handled, as the milk may absorb the odor of the oil.

11. After use, the parts of the sterilizer, especially the roasting pan and cover, should be cleaned and wiped dry to prevent rusting.

12. The sterilizer described herein should be built exactly according to specifications in order to attain the satisfactory results claimed.